REMARKS/ARGUMENTS

Claims 1-9 are pending in the present application. Claims 1-9 have been rejected under 35 U.S.C. § 103(a). Claims 1-4 and 7-9 have been rejected as being unpatentable over McCormick (U.S. Patent No. 5,012,722) and in view of Takano et al. (U.S. Patent No 5,938, 947). Claims 5 and 6 have been rejected as being unpatentable over McCormick and in view of Bergstrom (U.S. Patent No. 6,249,418). In response, Applicant has amended independent claims 1, 8 and 9. The amendment is fully supported by the original disclosure. No new matter has been introduced. Applicant reasserts previous arguments and believes all claims are in allowable form. Consequently, Applicant respectfully requests allowance of such claims.

Antecedent Basis of Amendments:

The preamble to claim 1 has been amended to change "PWM" to "pulse width modulator" to maintain congruency with claims 8 and 9 that make mention of "pulse width modulator" as opposed to "PWM".

Claims 1 and 9 have been amended to require in part, "transmitting a feedback signal to a digitizing device *that is a finite impulse response filter*…." (Emphasis added). This amendment finds its antecedent basis in the original disclosure, under the Brief Summary of the Invention, page 2, wherein it states, "[t]he method includes transmitting a feedback signal to a digitizing device *that is a finite impulse response filter* that samples the signal." (Emphasis added). This amendment also finds support under the Detailed Description of the Invention, page 3, wherein it states, "[t]he coil 12 electrically transmits a feedback signal 14 to the digitizing device with accumulator 16, or *Finite Impulse Response filter*."

(Emphasis added). Additionally, original claim 8 makes mention of "finite impulse response filter".

Claim 1 has also been amended to require in part, "sampling the feedback signal within the digitizing device to create a plurality of signal samples *within a pulse width modulator cycle*." (Emphasis added). This amendment finds its antecedent basis in the original disclosure, under the Detailed Description of the Invention, page 3, wherein it states, "[i]n the digitizing device 16 the signal 14 is sampled at a rate high enough so that *multiple samples per PWM period*, or a plurality of samples, are taken." (Emphasis added).

Claim 8 has been amended to require in part, "calculating an average current in the signal *within a pulse width modulator cycle* with the finite impulse response filter." (Emphasis added). Similarly, claim 9 has been amended to require in part, "calculating the amount of average current in the coil *within a pulse width modulator cycle* with the digitizing device." (Emphasis added). These amendments find their antecedent basis in the original disclosure, under the Detailed Description of the Invention, page 3, wherein it states, "[i]n the digitizing device 16 the signal 14 is sampled at a rate high enough so that *multiple samples per PWM period*, or a plurality of samples, are taken." (Emphasis added). The specification then goes on to describe that an average value is then calculated and then passed on "to determine the pulse width of the next cycle 10." (Page 3). Then, "[t]he accumulator is reset to zero and the cycle 10 starts over again." Id. Therefore the average current is calculated *within a pulse width modulator cycle*.

Consequently, Applicant believes all amendments are fully supported by the original disclosure.

Allowance of Claims 1 and 9 - Finite Impulse Response Filter:

Applicant has amended claims 1 and 9 to require, in part, the limitation of "transmitting a feedback signal to a digitizing device that is *a finite impulse response filter*." (Emphasis added). By using a finite impulse response filter:

> the feedback signal 14 has a lower lag than in prior art devices that use Infinite Impulse Response filters. With this very small lag, the control algorithm 20 is tuned for fast response and is still able to maintain stability. This fast response is increasingly important as total system performance is gaining focus and more and more electronics are used for various types of machine control. Thus the electrohydraulic valve performs at an optimum level.

(Specification, page 4). Nowhere does the prior art teach this limitation. Therefore, Applicant's invention is an improvement over the prior art.

Nowhere does McCormick teach the use of a finite impulse response filter. Rather, McCormick teaches the use of various processing devices (microprocessor 100a, address bus 200, data bus 202, program ROM 204, data RAM 206, input port decode 208, command input device 102, analog multiplexer 210, analog to digital converter 212, differential pressure transducer 112a, actuator position transducer 112b, actuator velocity transducer 112c, actuator force transducer 112d, etc.). (Col. 7 Lines 12-39 and Figure 8). Despite teaching the use of all of these devices, nowhere does McCormick expressly teach the use of a finite impulse response filter.

Takano does not cure McCormick, as Takano also does not teach the use of a finite impulse response filter. Rather, Takano teaches the use of a microcomputer 61 "as a one-chip LSI device which included a microprocessor (MPU) corresponding to a central processing unit (CPU), A/D and D/A converters connected

as input and output devices to the microprocessor, I/O ports, a read-only memory (ROM) … a random access memory (RAM) … a timer circuit, and an interrupt processing circuit." (Col. 5 lines 1-8). Despite this teaching, nowhere does Takano expressly teach the use of a finite impulse response filter.

Therefore, neither McCormick nor Takano disclose each and every element required in claims 1 and 9 and therefore Applicant respectfully requests that the rejection be withdrawn. Consequently, Applicant believes claims 1 and 9 are in allowable form and respectfully requests allowance of such claims. Additionally, dependent claims 2-7 depend on claim 1 and for at least this reason are also considered in allowable form.

Allowance of Claims 1, 8 and 9 - Within Each Pulse Width Modulator Cycle:

Applicant has amended claims 1, 8 and 9 to require, in part, the limitation of sampling or calculating a signal "*within each pulse width modulator cycle*." (Emphasis added). As stated in the specification:

> [C]ycle 10 begins at the PWM driven coil of the electrohydraulic valve 12 wherein the PWM drive produces a feedback signal 14. The signal is fed into the digitizing device 16. In the digitizing device 16 the signal 14 is sampled at a rate high enough so that multiple samples per PWM period, or a plurality of samples, are taken. Each time a sample is taken, the digital value is added to the accumulator within the digitizing device 16. At a given, fixed location within the PWM cycle 10, the accumulator is divided by the number of samples within the cycle 10. This yields the average value of the current within one cycle 10. This result is passed to the closed loop control algorithm 20 via signal 18 to determine the pulse width of the next cycle 10 via pulse width signal 22. The accumulator is reset to zero and the cycle 10 starts over again.

(Page 3). This method enables the control of an electrohydraulic valve such that it performs at an optimum level. Nowhere does the prior art teach this limitation. Therefore, Applicant's invention is an improvement over the prior art.

Nowhere does McCormick teach the sampling or calculating of a signal "*within each pulse width modulator cycle*." Rather, McCormick simply teaches that "all the feedback devices can be sampled and the position of the electrohydraulic valve 11 can be accordingly adjusted approximately once every 1 ms." (Col. 7 Lines 58-61). Nowhere does McCormick expressly teach the sampling or calculating of a signal "*within each pulse width modulator cycle*."

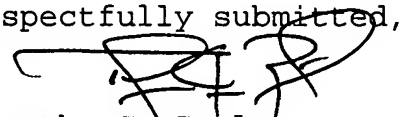
Takano does not cure McCormick, as Takano also does not teach the sampling or calculating of a signal "*within each pulse width modulator cycle*." Although, Takano discusses in great detail the method in which an average value is calculated (Col. 6 Line 22 - Col. 8 Line 38) nowhere in the specification does Takano teach the limitation of sampling or calculating of a signal "*within each pulse width modulator cycle*."

Therefore, neither McCormick nor Takano disclose each and every element required in claims 1, 8 and 9, therefore Applicant respectfully requests that the rejection be withdrawn. Consequently, Applicant believes claims 1, 8 and 9 are in allowable form and respectfully requests allowance of such claims. Additionally, dependent claims 2-7 depend on claim 1 and for at least this reason are also considered in allowable form.

CONCLUSION

If any issues remain that may be expeditiously addressed in a telephone interview, the Examiner is encouraged to telephone the undersigned at 515/558-0200. All fees or extensions of time believed to be due in connection with this response are attached hereto; however, consider this a request for any extension inadvertently omitted, and charge any additional fees to Deposit Account 50-2098.

Respectfully submitted,



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